09/673928

422 Rec'd PCT/PTO 24 OCT 2000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

REQUEST FOR FILING NATIONAL PHASE OF PCT APPLICATION UNDER 35 U.S.C. 371 AND 37 CFR 1.494 OR 1.495

To: Hon. Commissioner of Patents
Washington, D.C. 20231

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)

Atty Dkt: PM 274044 /0013US
M# /Client Ref.

From: Pillsbury Madison & Sutro LLP, IP Group:

Date: October 23, 2000

This is a **REQUEST** for **FILING** a PCT/USA National Phase Application based on:

1. International Application	2. International Filing Date	3. Earliest Priority Date Claimed
PCT/FI99/00336	26 April 1999	24 April 1998
⇧ country code	Day MONTH Year	Day MONTH Year
		(use item 2 if no earlier priority)

4. Measured from the earliest priority date in item 3, this PCT/USA National Phase Application Request is being filed within:

(a) ☐ 20 months from above item 3 date (b) ☒ 30 months from above item 3 date,

(c) Therefore, the due date (unextendable) is October 24, 2000

5. Title of Invention SURGE PROTECTOR

6. Inventor(s) MÄÄTTÄ, Hannu

Applicant herewith submits the following under 35 U.S.C. 371 to effect filing:

7. ☒ Please immediately start national examination procedures (35 U.S.C. 371 (f)).

8. ☐ **A copy of the International Application** as filed (35 U.S.C. 371(c)(2)) is transmitted herewith (file if in English but, if in foreign language, file only if not transmitted to PTO by the International Bureau) including:

a. ☐ Request;
b. ☐ Abstract;
c. ___ pgs. Spec. and Claims;
d. ___ sheet(s) Drawing which are ☐ informal ☐ formal of size ☐ A4 ☐ 11"

9. ☒ **A copy of the International Application has been transmitted by the International Bureau.**

10. **A translation of the International Application** into English (35 U.S.C. 371(c)(2))

a. ☒ Is transmitted herewith including: (1) ☐ Request; (2) ☒ Abstract;
(3) 5 pgs. Spec. and Claims;
(4) 2 sheet(s) Drawing which are:
☐ informal ☒ formal of size ☒ A4 ☐ 11"

b. ☐ Is not required, as the application was filed in English.

c. ☐ Is not herewith, but will be filed when required by the forthcoming PTO Missing Requirements Notice per Rule 494(c) if box 4(a) is X'd or Rule 495(c) if box 4(b) is X'd.

d. ☐ Translation verification attached (not required now).

11. ☒ **PLEASE AMEND** the specification before its first line by inserting as a separate paragraph:
a. ☒ --This application is the national phase of international application PCT/FI99/00336 filed April 26, 1999 which designated the U.S.--
b. ☐ --This application also claims the benefit of U.S. Provisional Application No. 60/ ___, filed ___ .--

12. ☐ Amendments to the claims of the International Application **under PCT Article 19 (35 U.S.C. 371(c)(3)), i.e., before 18th month from first priority date above in item 3, are transmitted herewith (file only if in English) including:**

13. ☒ PCT Article 19 claim amendments (if any) have been transmitted by the International Bureau

14. ☐ Translation of the amendments to the claims **under PCT Article 19 (35 U.S.C. 371(c)(3)), i.e., of claim amendments** made before 18th month, **is attached (required by 20th month from the date in item 3 if box 4(a) above is X'd, or 30th month if box 4(b) is X'd, or else amendments will be considered canceled).**

15. **A declaration of the inventor** (35 U.S.C. 371(c)(4))
a. ☐ is submitted herewith ☐ Original ☐ Facsimile/Copy
b. ☒ is not herewith, but will be filed when required by the forthcoming PTO Missing Requirements Notice per Rule 494(c) if box 4(a) is X'd or Rule 495(c) if box 4(b) is X'd.

16. **An International Search Report (ISR):**
a. Was prepared by ☐ European Patent Office ☐ Japanese Patent Office ☒ Other
b. ☒ Has been transmitted by the international Bureau to PTO.
c. ☒ copy herewith (3 pg(s).) ☒ plus Annex of family members (1 pg(s).).

17. **International Preliminary Examination Report** (IPER):
a. ☒ has been transmitted (if this letter is filed after 28 months from date in item 3) in English by the International Bureau with Annexes (if any) in original language.
b. ☒ copy herewith in English.
c.1 ☐ IPER Annex(es) in original language ("Annexes" are amendments made to claims/spec/drawings during Examination) including attached amended:
c.2 ☐ Specification/claim pages #___ claims #
Dwg Sheets #
d. ☐ Translation of Annex(es) to IPER **(required by 30th month due date, or else annexed amendments will be considered canceled).**

18. **Information Disclosure Statement** including:
a. ☒ Attached Form PTO-1449 listing documents
b. ☒ Attached copies of documents listed on Form PTO-1449
c. ☒ A concise explanation of relevance of ISR references is given in the ISR.

19. ☐ **Assignment** document and Cover Sheet for recording are attached. Please mail the recorded assignment document back to the person whose signature, name and address appear at the end of this letter.

20. ☐ Copy of Power to IA agent.

21. ☐ **Drawings** (complete only if 8d or 10a(4) not completed): __ sheet(s) per set: ☐ 1 set informal; ☐ Formal of size ☐ A4 ☐ 11"

22. Small Entity Status ∅ ☐ is **Not** claimed ☐ is claimed (**pre**-filing confirmation required)
22(a) ___ (No.) Small Entity Statement(s) enclosed (since 9/8/00 Small Entity Statements(s) not essential to make claim)

23. **Priority** is hereby claimed under 35 U.S.C. 119/365 based on the priority claim and the certified copy, both filed in the International Application during the international stage based on the filing in (country) FINLAND of:

	Application No.	Filing Date		Application No.	Filing Date
(1)	980905	April 24, 1998	(2)		
(3)			(4)		
(5)			(6)		

a. ☒ See Form PCT/IB/304 sent to US/DO with copy of priority documents. If copy has not been received, please proceed promptly to obtain same from the IB.
b. ☐ Copy of Form PCT/IB/304 attached.

RE: USA National Filing of PCT/FI99/00336

422 Rec'd PCT/PTO 24 OCT 2000

24. Attached: Preliminary Amendment, Copy of Form PCT/IB/306, Certified Copy of Finnish Application 980905 translated in English, and Office Action translation in English.

25. **Preliminary Amendment:**

25.5 Per Item 17.c2, **cancel original** pages #___, claims #___, Drawing Sheets #

26. **Calculation of the U.S. National Fee (35 U.S.C. 371 (c)(1)) and other fees is as follows:**

Based on amended claim(s) per above item(s) ☐ 12, ☐ 14, ☐ 17, [X] 24, ☐ 25.5 (hilite)

Total Effective Claims	minus 20 =	x $18/$9	=	$0	966/967
Independent Claims	minus 3 =	x $80/$40	=	$0	964/965
If any proper (ignore improper) Multiple Dependent claim is present,		add$270/$135		+0	968/969

BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(4)): →→ **BASIC FEE REQUIRED, NOW** →→→→

A. If country code letters in item 1 are **not** "US","BR","BB","TT","MX","IL" "NZ", "IN" or "ZA"

See item 16 re:

1. Search Report was not prepared by EPO or JPO	add$1000/$500		960/961
2. Search Report was prepared by EPO or JPO	add$860/$430	+1000	970/971

SKIP B, C, D AND E UNLESS country code letters in item 1 are "US","BR","BB","TT","MX","IL", "NZ", "IN" or "ZA"

(X) → ☐ B.	If USPTO did not issue both International Search Report (ISR) and (if box 4(b) above is X'd) the International Examination Report (IPER),	add$970/$485	+0	960/961
(only) (one) → ☐ C. (of)	If USPTO issued ISR but not IPER (or box 4(a) above is X'd),	add$710/$355	+0	958/959
(these) (4) → ☐ D. (boxes)	If USPTO issued IPER but IPER Sec. V boxes not all 3 YES,	add$690/$345	+0	956/957
→ ☐ E.	If international preliminary examination fee was paid to USPTO and Rules 492(a)(4) and 496(b) satisfied (IPER Sec. V all 3 boxes YES for all claims),	add $100/$50	+0	962/963
27.		**SUBTOTAL =**	$1000	
28.	If Assignment box 19 above is X'd, add Assignment Recording fee of ----$40		+0	(581)
29.	Attached is a check to cover the	**TOTAL FEES**	$1000	

Our Deposit Account No. 03-3975
Our Order No. 81942 (C#) 274044 (M#)

CHARGE STATEMENT: The Commissioner is hereby authorized to charge any fee specifically authorized hereafter, or any missing or insufficient fee(s) filed, or asserted to be filed, or which should have been filed herewith or concerning any paper filed hereafter, and which may be required under Rules 16-18 and 492 (missing or insufficient fee only) now or hereafter relative to this application and the resulting Official document under Rule 20, or credit any overpayment, to our Account/Order Nos. shown above for which purpose a duplicate copy of this sheet is attached.
This CHARGE STATEMENT does not authorize charge of the issue fee until/unless an issue fee transmittal form is filed

Pillsbury Madison & Sutro LLP
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NOTE: File in duplicate with 2 postcard receipts (PAT-103) & attachments.

IN THE UNITED STATEMENT PATENT OFFICE

In re PATENT APPLICATION of

MÄÄTTÄ, Hannu

Atty Dkt.: 274044

Appln. No.: Unknown

Group Art Unit: Unknown

Filed: HEREWITH

Examiner: Unknown

Title: SURGE PROTECTOR

* * * * * *

October 24, 2000

PRELIMINARY AMENDMENT

Hon. Commissioner of Patents
and Trademarks Office
Washington, D.C. 20231

Sir:

Please amend this application as follows:

IN THE CLAIMS:

1. (Amended) Surge protector which includes a film pattern [(2)] formed on a suitable substrate [(1)], [characterized in that] wherein the film pattern [(2)] essentially consists of narrow lines [(2a, 2b, 2c)] which extend parallel and adjacent to each other and are electrically in parallel relationship to each other, and bridges [(11 - 24)] between the lines.

2. (Amended) Surge protector of claim 1, [characterized in that] wherein the number of parallel lines [(2)] is three [(2a, 2b, 2c)].

3. (Amended) Surge protector of claim 1 [or 2], [characterized in that] wherein between two successive bridges [(15, 17)] only one [(2c)] of the lines [2a, 2b, 2c)] is cut off [(T5, T6, T7, T8, T9, T10)] for trimming the resistance value of the film pattern.

4. (Amended) Surge protector of [any preceding] claim 1, [characterized in that] wherein the film pattern is formed between two points [(3, 4)] so that [the] a length and resistance of each parallel line [(2a, 2b, 2c)] between said points are essentially the same.

5. (Amended) Surge protector of [any preceding claim] claim 1, [characterized in that] wherein the pattern formed by parallel lines [(2)] is a serpentine or technically equivalent pattern for making [the] a high frequency current of a pulse concentrating in [the] edges of the film lines to be distributed evenly over the substrate covered by the film pattern.

Respectfully submitted,

PILLSBURY MADISON & SUTRO LLP

By Richard C. Irving

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Surge protector

The invention is related to surge protectors manufactured by film techniques and provided for warding off and withstanding high instantaneous overvoltage pulses.

One way of manufacturing this kind of surge protectors is to form a serpentine shaped or technically equivalent film pattern of material with suitable resistance on a suitable substrate with good thermal conductivity. As the high frequency current of a overvoltage pulse is concentrated in the edges of the film, a serpentine shaped or technically equivalent narrow film line causes that the current and at the same time the heating up are distributed relatively evenly over a large area on the substrate.

Today, a preferred manufacturing technique of this type of surge protection resistors is thick film technology in which the substrate is a ceramic substrate and the film is made of material specifically manufactured for this kind of applications. One manufacturer of this kind of materials is DuPont Electronic Materials having thick film material series 7300 and 7400 for these purposes. These materials are suitable compositions of, e. g., silver, palladium and glass material which provide a low temperature coefficient of resistance, high enough trimming accuracy and good stability against the effects of overvoltage pulses. The resistivity of a resistor film is typically from 100 to 1000 mΩ/□. The resistor film may be further protected by a suitable glazing or equivalent which reduces oxidization and change of properties caused thereby as the effect of an overvoltage pulse is heating up the resistor and the substrate.

Surge protection components manufactured by thick film technology include often several protection resistors on one substrate, either adjacent to each other on the same side of the substrate or as printed on the both sides of the substrate. They are widely used in telecommunication equipment, and, e. g., for protecting telephone lines each conductor of a line needs its own protection resistor. An absolute tolerance of 5 % and a relative tolerance of 1 % are normal requirements for protection resistors. Therefore the resistors are to be trimmed. For trimming the pattern, serpentine, spiral or equivalent, is designed to included a suitable amount of bridges so as to lengthen the line by cutting bridges until the desired value is reached. Because only a tolerance of ± 30 % may be obtained without trimming, the possible need for wide range trimming must be taken into account. That is to say, there must be enough bridges. On the other hand, if the need for trimming is small, the most of the bridges are not cut and the current of the overvoltage pulse is flowing through the bridges. Then, there exist a lot of parts in the film pattern through which the

current is not flowing. This means that cold spots are left on the substrate, and the failure risk of the resistor component is increased.

Several solutions are developed to overcome this problem, a widely used solution being demonstrated by the example of Figs. 1 and 2. A narrow film line 2, which forms a protection resistors, makes a serpentine shaped pattern on the substrate 1 between contact areas 3 and 4. The width of the line may be 0.5 to 1 mm, for example. At several places a line coming to and a line leaving a turning point 6a ... 6h are connected by a bridge 5a ... 5h, respectively, and at a place close to the contact area 4 there is a special loop 6i of line 2. The resistance of the serpentine pattern is trimmed by appropriately cutting bridges, as is indicated by the arrow T at the bridge 5a in Fig. 1 and by trimming points T1, T2, T3 and T4 indicated by broken line in Fig. 2. As a bridge is cut, the resistor formed by the serpentine is lengthened and the resistance thereof is increased. In the example of Fig. 2, scarcely anything of the current of an overvoltage pulse flows through the loops 6b, 6c, 6e and 6h, and so these places remain colder than the circumference thereof during the influence of a pulse.

The solution of US patent 4 999 731 is, in principle, the same as the solution of Figs. 1 and 2. Therein, the trimming points are placed as close as possible to the edges of the substrate and the serpentine pattern by means of which the temperature distribution is made even especially in the central area of the substrate.

On the other hand, US patent 5 057 964 presents a solution based on a spiral pattern. The trimming is made by cutting only bridges in the central area of the spiral. In this case the temperature distribution is even in the peripheral area of the pattern, but the central parts of the spirals remain the colder the less the resistors are trimmed.

An object of the invention is to present a solution by means of which the distribution of the current is made as even as possible both without any trimming at all and with various trimmings.

For realizing this and other objects of the invention the surge protector in accordance with the invention is characterized by the features defined by claim 1 of the appended claims. Other claims define various embodiments of the invention.

The solution in accordance with the invention is characterized in that the film pattern essentially consists of narrow lines, which extend parallel and adjacent to each other, and bridges between the lines. Advantageously, there are three parallel lines, and for trimming the resistance of the film pattern only one of the lines is cut off between successive bridges. So, for the high frequency current to flow, there are still two film lines and four edges thereof in which the flow of the current is concentrated. As the lines are close to

each other, only a relatively narrow band is left at each trimming point in which the current does not flow and heat up the substrate during the incluence of a pulse. The trimming points may be placed in such a way that active lines are located at each side thereof, whereby the heat is distributed in the thermally conducting substrate quite well also to the area of the line cut off by trimming.

The invention and some embodiments thereof are explained in more detail in the following with reference to the attached drawings, wherein:

Figs. 1 and 2 a prior art realization of a surge protector, and

Figs. 3 and 4 present schematically an exemplary realization of a surge protector in accordance with the invention.

The prior art solution was considered above in the introductory part of the specification with reference to Figs. 1 and 2.

In Fig. 3, on a substrate 1 between contact areas 3 and 4 there is a film pattern including three parallel film lines 2a, 2b, 2c and bridges 11, 12, ... , 23, 24 therebetween, the pattern forming a surge protection resistor. The film pattern forms a serpentine which covers uniformly the area provided for the resistor. The contact areas 3 and 4 are made of conventional conductor material with good solderability while the film pattern is made of material meant for this kind of application, e. g. DuPont 7300 series material. The width of the lines may be of the order of 0.5 mm, for example. For making the distribution of the current even, the lines are advantageously manufactured in such a way that they have essentially the same resistance between the contact areas 3 and 4. Also advantageously, the bridges at the turning areas of the serpentine are made so that the resistance of each line within the turning area is essentially the same. The current of a pulse is then distributed evenly also within the turning area. In the figures, therefore, the bridges 11, 12; 13, 14; 15, 16 and the other similar bridges within the turning areas of the serpentine are widening towards the edge of the substrate. The trimming is here meant to be made by cutting off line 2c at suitable points. Other bridges 17, 18, 19, 20, 21, 22, 23, 24 are therefore only between lines 2b and 2c. Film lines 2a and 2b are positioned quite close to each other while line 2c is at a little greater distance from line 2b for making the trimming easier.

Fig. 4 presents an example of trimming the film pattern. In this case, the resistance within the desired tolerances is obtained by cutting off line 2c at points T5, T6, T7, T8, T9 and T10.

As stated above, the film pattern forming the resistor is normally covered by a glazing or other suitable protective coating which improves the properties of the

protection resistor, e. g. reduces the change of the resistance value caused by a pulse. The trimming, normally laser trimming, is made through the protective coating. Leads are attached by soldering to the contact areas for connection to a printed circuit board, for example, and a surge protector in a form of a conventional SIL or DIL type hybrid circuit is obtained.

Here, only one protection resistor covering the whole area of substrate 1 is presented schematically, but there are often several protection resistors and may be also some other resistors and sometimes other electronic components placed on the same side or on the both sides of a substrate.

There may be also more than three parallel film lines, but for example in the sepentine embodiment the number three of lines is advantageous. The widths of the lines may differ from each other to some extent, and also the width of each line may vary within certain limits. Also the positioning of the bridges and trimming points may vary widely.

Serpentine pattern is an advantageous way of realizing the invention but, in principle, also a spiral type realization, which is used in similar protection resistor applications, is possible.

The surge protector of the invention may also be accomplished with other suitable technology than thick film technology which, however, is obviously very advantageous way of realizing the invention.

The invention may vary within the scope of the appended claims.

Claims

1. Surge protector which includes a film pattern (2) formed on a suitable substrate (1), **characterized** in that the film pattern (2) essentially consists of narrow lines (2a, 2b, 2c) which extend parallel and adjacent to each other and are electrically in parallel relationship to each other, and bridges (11 - 24) between the lines.

2. Surge protector of claim 1, **characterized** in that the number of parallel lines (2) is three (2a, 2b, 2c).

3. Surge protector of claim 1 or 2, **characterized** in that between two successive bridges (15, 17) only one (2c) of the lines (2a, 2b, 2c) is cut off (T5, T6, T7, T8, T9, T10) for trimming the resistance value of the film pattern.

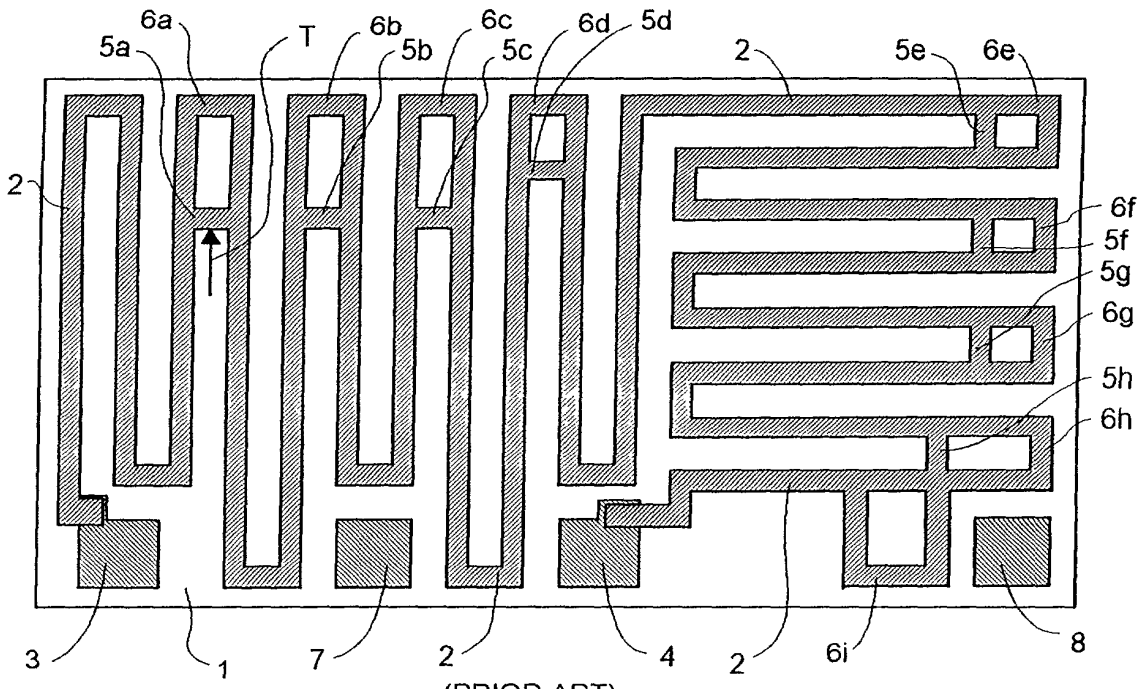
4. the film pattern is formed between two points (3, 4) so that the length and resistance of each parallel line (2a, 2b, 2c) between said points are essentially the same.

5. Surge protector of any preceding claim, **characterized** in that the pattern formed by parallel lines (2) is a serpentine or technically equivalent pattern for making the high frequency current of a pulse concentrating in the edges of the film lines to be distributed evenly on the substrate covered by the film pattern.

(57) Abstract

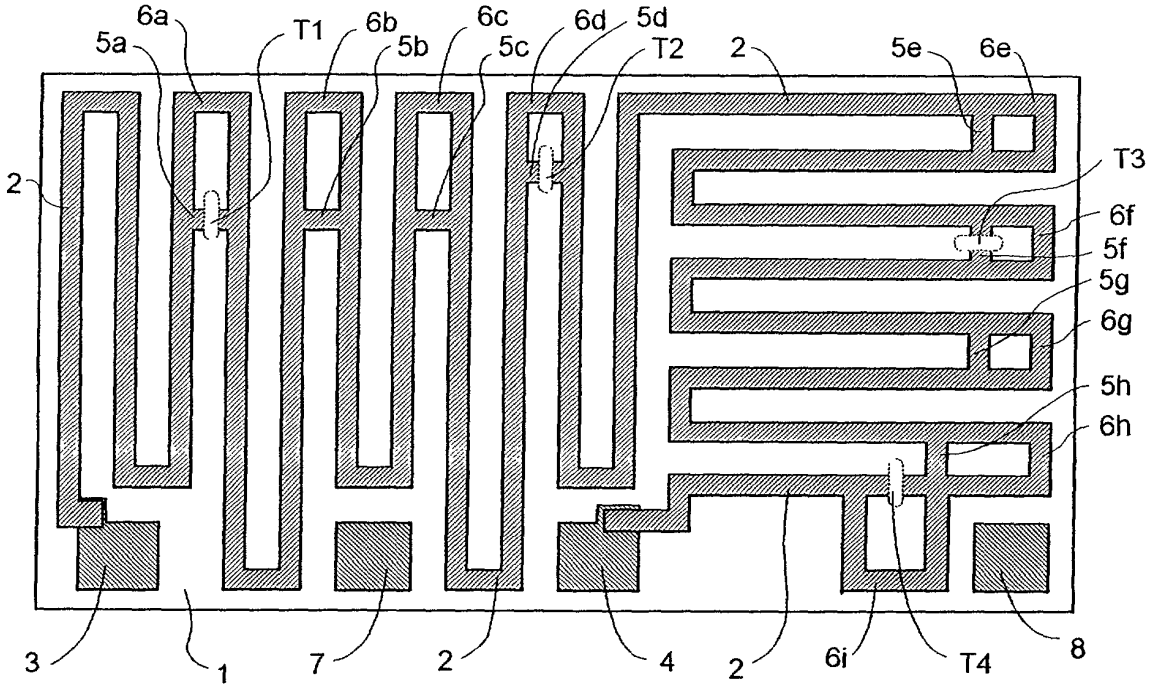
Surge protector which includes a film pattern (2) formed on a suitable substrate (1) is characterized in that the film pattern (2) essentially consists of narrow lines (2a, 2b, 2c) which extend parallel and adjacent to each other and are electrically in parallel relationship to each other, and bridges (11 - 24) between the lines. Advantageously, there are three parallel lines. The resistance of the film pattern (2) is trimmed advantageously by cutting (T5, T6, T7, T8, T9, T10) one of the lines (2c) between successive bridges.

Fig. 4



(PRIOR ART)

Fig. 1



(PRIOR ART)

Fig. 2

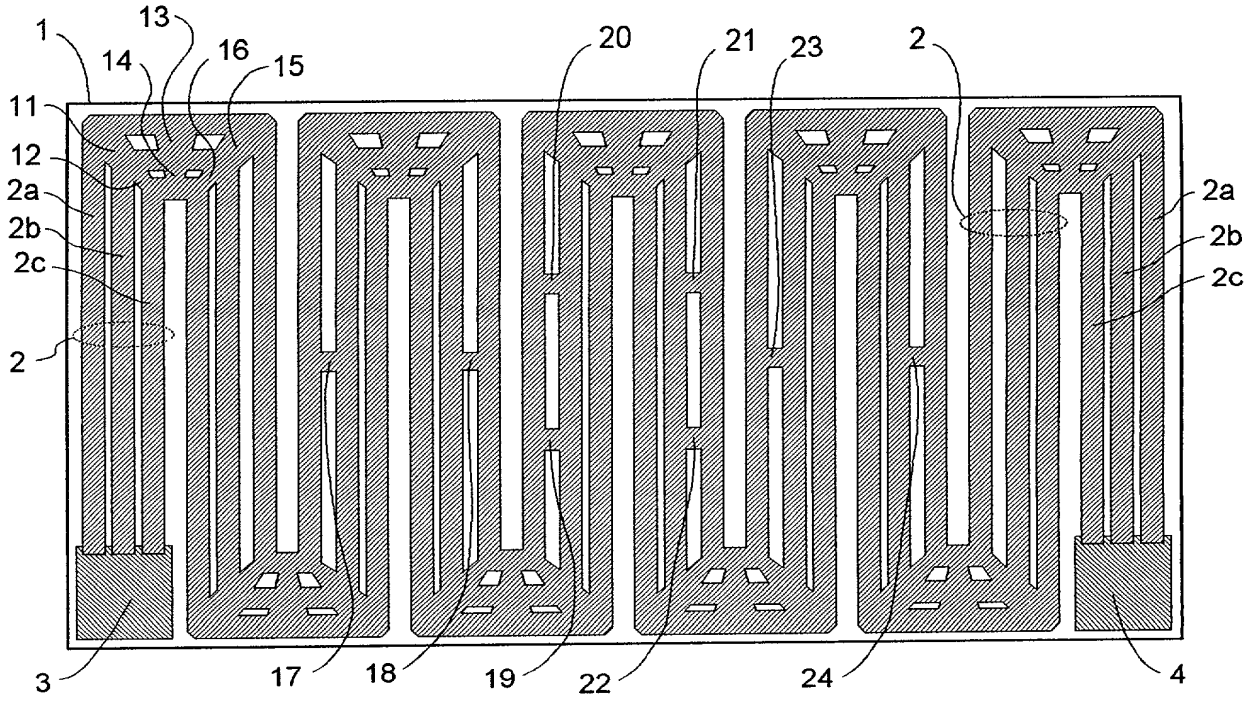

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Fig. 3

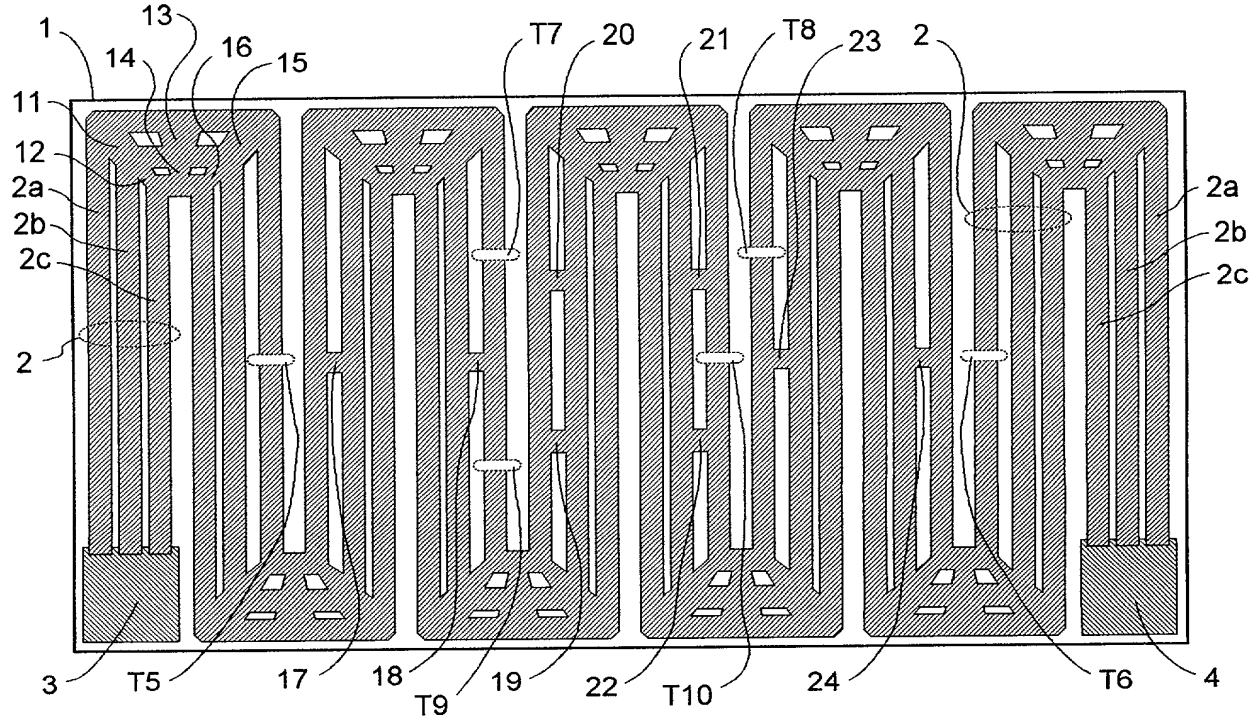
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Fig. 4

FOR UTILITY/DESIGN
CIP/PCT NATIONAL/PLANT
ORIGINAL/SUBSTITUTE/SUPPLEMENTAL
DECLARATIONS

RULE 63 (37 C.F.R. 1.63)
DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATION
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

13 DEC 2000 PM & S FORM

09/673929

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name, and I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the **INVENTION ENTITLED**

Surge Protector

the specification of which (CHECK applicable BOX(ES))

X A. ☐ is attached hereto.

BOX(ES) → B. ☐ was filed on _____ as U.S. Application No. _____ / _____

→ → C. ☒ was filed as PCT International Application No. PCT/ FI99/00336 on 26 April 1999

and (if applicable to U.S. or PCT application) was amended on _____

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose all information known to me to be material to patentability as defined in 37 C.F.R. 1.56. Except as noted below, I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT International Application which designated at least one other country than the United States, listed below and have also identified below any foreign application for patent or inventor's certificate, or PCT International Application, filed by me or my assignee disclosing the subject matter claimed in this application and having a filing date (1) before that of the application on which priority is claimed, or (2) if no priority claimed, before the filing date of this application:

PRIOR FOREIGN APPLICATION(S) Number	Country	Day/MONTH/Year Filed	Date first Laid-open or Published	Date Patented or Granted	Priority NOT Claimed
980905	Finland	24 April 1998			

If more prior foreign applications, X box *at bottom* and continue on attached page.

Except as noted below, I hereby claim domestic priority benefit under 35 U.S.C. 119(e) or 120 and/or 365(c) of the indicated United States applications listed below and PCT international applications listed above or below and, if this is a continuation-in-part (CIP) application, insofar as the subject matter disclosed and claimed in this application is in addition to that disclosed in such prior applications, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in 37 C.F.R. 1.56 which became available between the filing date of each such prior application and the national or PCT international filing date of this application:

PRIOR U.S. PROVISIONAL, NONPROVISIONAL AND/OR PCT APPLICATION(S) Application No. (series code/serial no.)	Day/MONTH/Year Filed	Status pending, abandoned, patented	Priority NOT Claimed

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

And I hereby appoint Pillsbury Madison & Sutro LLP, Intellectual Property Group, 1100 New York Avenue, N.W., Ninth Floor, East Tower, Washington, D.C. 20005-3918, telephone number (202) 861-3000 (to whom all communications are to be directed), and the below-named persons (of the same address) individually and collectively my attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith and with the resulting patent, and I hereby authorize them to delete names/numbers below of persons no longer with their firm and to act and rely on instructions from and communicate directly with the person/assignee/attorney/firm/ organization who/which first sends/sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct the above Firm and/or a below attorney in writing to the contrary.

Paul N. Kokulis	16773	Dale S. Lazar	28872	Mark G. Paulson	30793	Michael R. Dzwonczyk	36787
Raymond F. Lippitt	17519	Paul E. White, Jr.	32011	Stephen C. Glazier	31361	W. Patrick Bengtsson	32456
G. Lloyd Knight	17698	Glenn J. Perry	28458	Paul F. McQuade	31542	Jack S. Barufka	37087
Carl G. Love	18781	Kendrew H. Colton	30368	Ruth N. Morduch	31044	Adam R. Hess	41835
Kevin E. Joyce	20508	G. Paul Edgell	24238	Richard H. Zaitlen	27248		
George M. Sirilla	18221	Lynn E. Eccleston	35861	Roger R. Wise	31204		
Donald J. Bird	25323	Timothy J. Klima	34852	Jay M. Finkelstein	21082		
Peter W. Gowdey	25872	David A. Jakopin	32995	Anita M. Kirkpatrick	32617		

(1) **INVENTOR'S SIGNATURE:** _____ **Date:** 4 October 2000

	First	Middle Initial	Family Name
	Hannu		Määttä
Residence	Pikisaarentie 1 C 37	FIN-90100 Oulu, Finland	Finland
	City	State/Foreign Country	Country of Citizenship
Post Office Address	Same as Residence Address		
(include Zip Code)			

(2) **INVENTOR'S SIGNATURE:** **Date:**

	First	Middle Initial	Family Name
Residence			
	City	State/Foreign Country	Country of Citizenship
Post Office Address			
(include Zip Code)			

FOR ADDITIONAL INVENTORS, "X" box ☐ and proceed on the attached page to list each additional inventor.

☐ See additional foreign priorities on attached page (incorporated herein by reference).

Atty. Dkt. No. PM _____ (M#)

PAT-116 11/99(2)